



# Air Force Research Laboratory | AFRL

*Science and Technology for Tomorrow's Aerospace Forces*

## **Success Story**

### **DR. PHILIP BERAN RECEIVES THE GENERAL BENJAMIN D. FOULOIS AWARD**



The Air Vehicles Directorate recently awarded the General Benjamin D. Foulois Award to Dr. Philip Beran, Structural Design and Development Branch, Structures Division, for his pioneering research on high-fidelity design analysis for nonlinear aeroelastic systems. Dr. Beran successfully applied his technique to a variety of physical systems including a chemical reactor. His reduced-order modeling (ROM) aerodynamic analysis shows a 100-fold efficiency improvement for the prediction of nonlinear, quasistatic solutions and a 10-fold improvement in the prediction of unsteady solutions.



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### **Accomplishment**

Dr. Beran developed a fast, new approach for modeling nonlinear, aeroelastic systems, enabling researchers to explore the stability of new vehicle concepts. By creating a technology that captures physics-based, fluid-structure interactions in air vehicle systems at the design level, Dr. Beran eliminates potentially destructive aeroelastic behaviors prior to development.

Dr. Beran successfully demonstrated that researchers could compute fundamentally nonlinear behaviors with a very small number of degrees of freedom, leading to significant improvements in modeling efficiency. Dr. Beran also significantly contributed to the field of ROM by developing a multi-purpose algorithm, based on proper orthogonal decomposition, capable of reducing the size of discrete systems in a fully nonlinear fashion.

### **Background**

Benjamin Foulois enlisted in the Army in 1898 and, until his retirement as a Major General in 1935, contributed greatly to the Army and later to the Air Corps, including his participation in the 1909 trials of the Wright Flyer No.1. He also developed the first airplane radio receiver in 1911.

The directorate established the General Benjamin D. Foulois Award in 1965 in order to perpetuate this pioneering aviator's exploratory spirit. This award honors directorate engineers and scientists who made the most significant contributions to aerospace technology during the previous year.

Air Vehicles  
Awards and Recognition

### **Additional information**

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTT, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-VA-06)